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| **Subject: Algebra I Unit: Four** | |
| **Unit Topic and Length:**  **FUNCTIONS**  **(Three weeks)** | |
| **Common Core Learning Standards:**  **F‐IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y = f(x)*.  **F‐IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.  **F‐IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) =1, f(n+1) = f(n) + f(n*–*1) for n ≥ 1.*  **F‐IF.4** For a function that models a relationship between two quantities, interpret key features of  graphs and tables in terms of the quantities, and sketch graphs showing key features given a  verbal description of the relationship. *Key features include: intercepts; intervals where the*  *function is increasing, decreasing, positive, or negative; relative maximums and minimums;*  *symmetries; end behavior; and periodicity.*  **F‐IF.5** Relate the domain of a function to its graph and, where applicable, to the quantitative  relationship it describes. *For example, if the function h(n) gives the number of person‐hours it*  *takes to assemble n engines in a factory, then the positive integers would be an appropriate*  *domain for the function.*  **F‐IF.6** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.  **F‐IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.  **F‐IF.9** Compare properties of two functions each represented in a different way (algebraically,  graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one*  **F‐BF.1** Write a function that describes a relationship between two quantities.  a. Determine an explicit expression, a recursive process, or steps for calculation from a  context.  **F‐BF.3** Identify the effect on the graph of replacing *f(x)* by *f(x) + k*, *k f(x)*, *f(kx)*, and *f(x + k)* for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include*  *recognizing even and odd functions from their graphs and algebraic expressions for them.*  **F‐LE.1** Distinguish between situations that can be modeled with linear functions and with exponential functions.  **F‐LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input‐output pairs (include reading these from a table).  **F‐LE.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or (more generally) as a polynomial function.  **F‐LE.5** Interpret the parameters in a linear or exponential function in terms of a context | |
| **Big Ideas/Enduring Understandings:**  Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range.  Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.  For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.  Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.  Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. | **Essential Questions:**  What is a function?  Why is the domain and the range of a function important information to know?  What makes a pattern a sequence?  Why is it important to know about rates of change?  What does it mean graphically for a rate of change to be constant?  Why is it important to be able to use functions to model real life situations?  How do we understand the concept of a function and use function notation?  How do we interpret functions that arise in applications in terms of the context?  How do we analyze functions using different representations? |

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| **Content:**  **Understand the concept of a function and use function notation**  **Interpret functions that arise in applications in terms of the context**  **Analyze functions using different representations**  **Build a function that models a relationship between two quantities**  **Build new functions from existing functions**  **Construct and compare linear, quadratic, and exponential models and solve problems**  **Interpret expressions for functions in terms of the situation they model** | **Skills:**  Ability to determine if a relation is a function  Ability to identify the domain and range of a function from multiple representations  Ability to use of function notation  Knowledge of and ability to apply the vertical line test  Ability to make connections between context and algebraic representations which use function notation  Understand the nature and formulae for different types of sequences.    Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations  Ability to relate the concept of domain to each function studied Ability to describe the restrictions on the domain of all functions based on real world context  Knowledge that the rate of change of a function can be positive, negative or zero  Ability to identify the rate of change from multiple representations  Understand the nature of the constants and what they mean to the graph. Be able to find axis of symmetry and maximum and minimum points.  Ability to recognize common attributes of a function from various representations  Understand how to write and function from relationships between quantities.  Ability to add, subtract, multiply and divide functions  Understand how constants in a functions impact on the physical graph. Understand the nature of the shifts and how these relationships between different types of functions  Ability to recognize a linear relationship  Ability to recognize an exponential relationship  Ability to produce an algebraic model  Which types of functions increase more quickly and what is the rationale behind this.  Ability to interpret the slope and y-intercept of a linear model in terms of context. Ability to identify the initial amount present in an exponential model | **Days:**  **1**  **1**  **1**  **2**  **1**  **1**  **2**  **2**  **2**  **2**  **2**  **2**  **2**  **2** |
| **Assessment Evidence and Activities:**  Pre and Post Tests (formative assessment and assessments for evidence of growth)  Problem Solving Tasks and Activities  Quizzes  Questioning and Observations  Do Nows and Exit Slips  Class work and Homework | | |
| **Possible Support Strategies:**  Use of manipulatives  Word Walls and Individual Glossaries  Journals  Back Tracking Technique demonstrated for solving equations | | |
| **Formative Assessment:**  The assessments listed above will be used to identify students’ strengths and weaknesses.  There will be constant adjustments and fine tuning of the curriculum delivery based on this analysis. Sharing student work, sharing best practice and planning next steps will be an integral part of common planning meetings. | | |
| **Final Performance Based Task: See Attached** | | |
| **Extension:**  Differentiated column sheets for order of operations and evaluating like terms.  Table logic for adding and subtracting integers and polynomial expressions.  Differentiated column sheets for solving equations. | | |
| **Learning Plan & Activities:**  The learning plan will incorporate work shop style lessons which will allow for student centered learning. Group work will be incorporated into various concepts with a focus on students learning collaboratively. There will be an emphasis on technique to enable students to solve skills based questions. This will be supported with problem solving exercises for all content to give students a conceptual understanding of the material. | | |
| **Resources:**  Text book : Meaningful Math Algebra I Prentice Hall Mathematics Algebra I  Graphing calculators  Geometric Manipulatives, Sketchpad  Smart Board Demonstrations  Problem solving materials created by teachers | | |